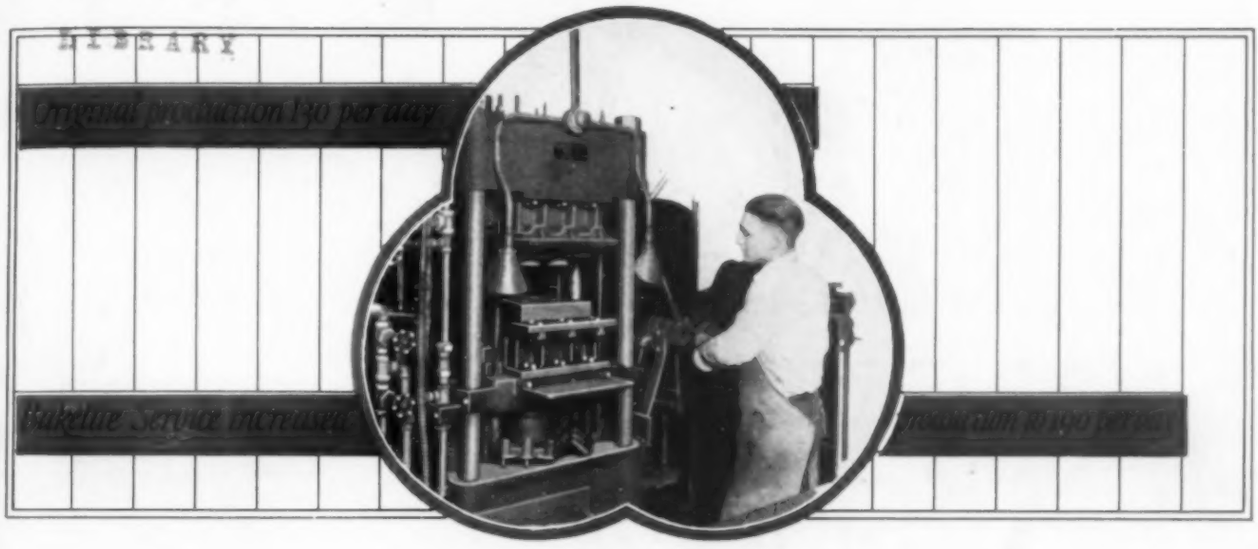
PLASTICS

A Periodical Devoted to the Manufacture and Use of Composition Products

FEBRUARY, 1928



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Molded Products

See Page 95

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PLASTICS
& MOLDED PRODUCTS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 4 FEBRUARY, 1928 No. 2

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PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 4 FEBRUARY, 1928 No. 2

German Insulating Materials

Standardization and cooperation have wrought marked changes in European practice. A new plastic made from old paper is a recent achievement.

By Heinrich Prehn,

Consulting Engineer; German Correspondent of Plastics

AS pointed out in last month's article, the German "Verein deutscher Ingenieure" (Society of German Engineers), abbreviated V. D. I. has issued standard specifications for insulating materials, and has classified them in accordance with their general properties and the requirements of the industry. The German governmental authorities also test molded and similar insulating material by these approved methods. The most important tests applied to the materials are the transverse breaking strength, electrical breakdown strength or puncture, and resistance to heat.

Electrical Tests

The electrical break-down or puncture tests is usually carried out by placing a sheet or plate of the material, if possible exactly 1 millimeter thick, and about 150 to 200 mm. square, between two flat electrodes. A potential of about one-tenth of the expected break-down or puncture strength is then applied, and the potential raised at intervals of one minute until the plate is punctured by the passage of a spark jumping through the material from one electrode to the other.

In the January issue of PLASTICS, *p. 15, the beginning of this article appeared. The author there described the fundamental principles underlying the manufacture of molded and laminated insulating materials as it has developed in Germany since the war.*

The present continuation deals essentially with the approved methods employed for testing the insulating materials, and their general classification.

An entirely new product made from old newsprint, and a plastic that can be die-cast, are also described.

This gradual increase of the current at a definite rate is a very important feature of the test, as when the current is very rapidly increased quite different results are often obtained. For example, if the potential of the electrodes is raised very rapidly, the break-down strength will occur at a higher potential than when the current is gradually raised, and hence the reading obtained will not be correct.

The breaking strength is determined by an instrument that applies a constant impact force at the exact center of a test piece of the material. The apparatus comprises a freely swinging pendulum carrying a wedge-shaped impact member. The pendulum is released from a definite point so that it will acquire a momentum that will be exactly the same for each test. This is accomplished by releasing the pendulum from a raised position and allowing it to hit the piece being tested at the bottom of its swing.

Breaking Tests

As the pendulum swings past the center and takes an upward course, and if there were no test piece interposed, it would theoretically, swing as high as the point from which it was released. As it passes the center it takes along with it a pointer that will remain at the highest point reached on the upward swing. This pointer passes over a suitable scale. The force required to break the test-piece will, however, take up some of the kinetic energy of the swinging pendulum, and hence it will not rise as far as the point from which it descended. The

stronger the piece, the less the distance traversed after the impact. By reference to the scale with which the instrument is provided and to the cross-section, the impact transverse breaking strength is determined. This is usually expressed in terms of centimeter-kilograms per square-centimeter.

This test has become standard throughout the world, and is one of the control tests made by the manufacturers of the insulating material. It has namely been found that insulating material that shows a high breaking strength also has very desirable physical properties that render it easy to machine.

Heat Test

The heat test is also of great importance. Although the insulating material may not be subjected to elevated temperatures, it is nevertheless true that if high potentials are applied that considerable heat will be developed in the material itself When used in the presence of transformer oil and the like considerable heat may also be thus applied to the material and its resistance to these influences is of great importance in the selection of a proper grade of insulation for a given purpose.

In making this test for heat resistance, measured pieces of the insulating material are kept from 24 hours to two weeks in a gradually rising temperature. Alternatively, when the probable point of break-down is known, the material may be kept at this temperature, and the time determined that is required to bring about visible physical changes at this temperature.

If the particular use to which the insulating material is to be put is known, this test is usually made special under the circumstances, and often is followed by a breaking strength test of the material that has thus been heated for some time, in order to ascertain what deleterious changes, if any, have resulted from the heating to which it has been subjected.

Based on the above tests specifications have been worked out. The more important and larger manufacturers of electrical apparatus insist upon an electrical puncture test of from 3,000 to 5,000 volts per millimeter thickness under permanent load; a transverse impact breaking strength of from 15 to 20 centimeter-kilograms per square centimeter of cross-section, and a resistance to temperature of from 150 to 175°C. when temporarily subjected to such heat.

Type of apparatus used for breaking strength test.
(Courtesy Tinius Olsen)

These tests are so severe, that the molded insulating materials containing fibrous materials rarely fully meet the specifications, and usually fall short of the requirements as to puncture strength and breaking strength Hard-paper (laminated insulation) however, usually more than meets the requirements.

Laminated Products

This apparent difficulty is however amply met by the molded materials as the thickness and other dimensions required are usually so chosen that there is a wide margin of safety. In the case of articles that are molded there is scarcely ever any need for further mechanical and machining operations. The electrical as well as mechanical strength is assured by making the objects large enough and thick enough to obtain the required resistance and strength.

The indurated and laminated paper products, (the so-called "hard papers") possess a greater mechanical strength than is actually required, and in this sense they are an anomaly in the electrotechnical industry. In some applications the mechanical strength of the hard paper employed may be several hundred times greater than that required, and even their electrical resistance is much higher than need be under the circumstances. For instance, in some transformer constructions and in oil-switches, the insulating material will actually have a higher insulating strength than the oil in the apparatus.

Using Paper Filler

For the reasons already stated, there has been for quite a while an active demand for an insulating material that, while possessing more suitable properties than those exhibited by molded fiber-containing materials, would meet the technical requirements of the electrical industries, but would also be very much cheaper than the hard papers.

It appeared quite likely that the problem could be solved by again starting out with paper as the base, only in this case to use somewhat thicker paper, and of a cheaper kind. These attempts however were not successful, as the inherent defects

of the product became quite evident and its use was severely limited. The difficulty is one that is common to all laminated structures of this kind, except when the very best and strongest paper is used for their construction. This lies in the fact that the mechanical strength all lies in one direction, which is at right angles to the paper layers. In the direction longitudinal of the paper layers the strength is very low, and it may even happen that the article will split along the natural cleavage lines existing between the individual paper layers. Even a common wood-screw driven into a laminated paper structure, unless the latter is exceptionally well made, will often tear out and cause an exfoliation of the individual layers.

Paper Pulp

A somewhat more suitable insulating material has recently been brought out in Germany. This is made by grinding up a medium grade of paper with a solution of a phenoplastic, and after evaporation of the solvent. pressing the material into plates or other objects. However, the products thus produced were little if any better than the regular molded products made from fibrous products, while the manufacturing difficulties proved to be very great. One of the main difficulties was the enormous volume occupied by the ground paper, and the irregularity with which the new products could be colored. Thus far these new paper molded products have not attained any great popularity, and it is doubted if much progress is to be expected in this direction.

A New Process

In the mean time an entirely new process has been developed. Patents have been applied for to cover it, but the following information can safely be given This process makes use of old newspapers and by proper impregnation and working has been made into a laminated hard paper type of product that exhibits remarkable properties and in some instances even has greater strength than the corresponding older types of hard papers. The process is a clever combination of a felting process and a process of pasting together. By reason of the felting that occurs between the layers, the transverse strength is more nearly equal in all directions, and, in fact, almost identical in any direction. The material is workable in much the same manner as hard rubber.

This new product has many very desirable properties and it would seem as though it had a real future. The electrical industries require a material that can not only be molded, but which can afterwards be subjected to many mechanical operations, such as planing turning on a lathe, drilling, tapping and cutting. Furthermore it should be possible to force metallic inserts into the material after the molding opera-

(*Continued on page 84*)

Bakelite in Italy

ACCORDING to Raffaele Sansone, Italian correspondent of *Industrial and Engineering Chemistry* (*News Edition, Dec. 20, 1927*). The manufacture of bakelite in Italy was begun in 1921. In 1923 the "Societa della Bakelite" was formed with a plant at Ferrania (Savona) which was previously a high explosive factory. The importance of this new industry was not only from its strictly economic standpoint, but also from the fact that it requires raw materials necessary for the national defense: cresol, phenol, formaldehyde. Cresol and phenol are now imported only in part, but their production from coal-tar derivatives has not developed as yet. Bakelite will absorb the greatest quantity in peace times. Synthetic phenol is manufactured for military use; formaldehyde has been manufactured during the past two years.

Widely Used

Bakelite finds many uses in Italy. If made from cresol and formaldehyde, it assumes the form of a gray irregular mass, known in commerce as bakelite resin, and is used principally in electrical appliances as insulating material (tubes, varnish, etc.), and in the form of a powder for use in the manufacture of radio parts; it is used also for automobile steering wheels and other appliances, and in the manufacture of special varnishes for bobbins used in th artificial silk industry. When made from phenol and formaldehyde, it is known commercially as pure bakelite or bakelite C and comes in blocks, sticks, or tubes, which is used in various articles—industrial and fancy notions, such as cigar and cigarette holders, umbrella handles, canes, boxes, etc.

As a result of the production of bakelite in Italy industries have been developed which specialize in manufacturing finished articles, for example, insulators, window-panes, and cloth used in electrical machinery, steering-wheels, and radio accessories. The industry manufactures all kinds of bakelite, and produces all domestic needs with a production of 250,000 kg. a year and an estimated value of about 4 million lire; the capacity of the plant is double this output. The industry employs about 100 people. The importation of bulk bakelite is most common and fluctuates around 200,000 lire per year.

Molding Resinoid Gears and Blanks

While formerly most of the laminated fiber gears were cut from sheet stock, the latest processes mold the entire object. Use of cord reinforcing interestingly described.

Compiled from recent patents by Carl Marx

APPARENTLY many variations on the general theme of molding synthetic resin gears can be worked out. Patents covering diverse new features of this art are being granted almost weekly, each one representing some new forward step in the further application of molded products to the growing needs of modern industry.

The non corrosiveness of the synthetic resin impregnated gears, their silent operation, and, in many cases, their free running qualities, are making them increasingly important.

In recent issues of our MOLDED PRODUCTS section the greatly increasing use of resinoid gears was described. In the present article some of the recently patented methods of producing entire finished gears are disclosed. The art is very active and shows promise of still greater development.

Re-use of Scrap

The first patent covers a gear blank having a body composed of chopped up, fibrous material and a cured reaction product binder, the body of the gear extending from the central portion to the circumference, and a thickened central portion forming a hub which is laminated and composed of layers of fabric impregnated with a similar binder that has likewise been hardened or cured, the layers being superimposed upon the body portion.

The particular advantage claimed in this patent, which is the invention of Louis T. Frederick, assignor to the Fibroc Insulation Co., U. S. P. 1,636,411; July 19, 1927; is the use of scrap ordinarily produced in the making of laminated phenol-resin impregnated gears. The scrap, which contains uncured phenol resin, is softened with a solvent, comminuted, and cold pressed into a preformed blank.

This blank can then either be finished in a hot press, or layers of phenol-resin impregnated fabric can be super-imposed upon it, and a composite gear formed, as first described.

Metallic Hubs

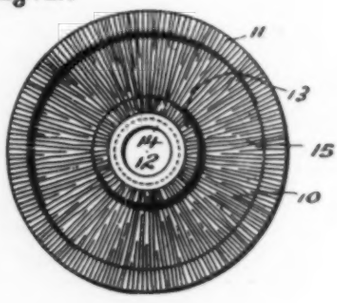
The second patent is assigned to the Westinghouse Electric & Mfg. Co., by the inventor, Harry C. Bierman, (U. S. P. 1,637,331; Aug. 2, 1927).

This invention is directed to a method of forming a composite gear wheel which comprises employing a strip of fibrous sheet material disposed in superposed layers and forming an endless helix about the periphery of a metal hub. The strip is slit transversely in such a manner as to form contiguous interlocking dove-tail sections which are alternately twisted or turned as the strip is being wound on the hub. These dovetailed sections when wound about, and molded to, the hub member provide a molded nonmetallic rim portion of uniform density throughout.

The third patent, U. S. P. 1,638,012; Aug. 9, 1927, assigned to the General Electric Co., by the inventor, Addison C. Hoof, represents quite a departure from the usual methods of forming molded gears.

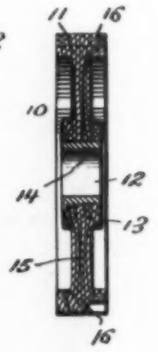
The Cord Gear

Fig. 1.

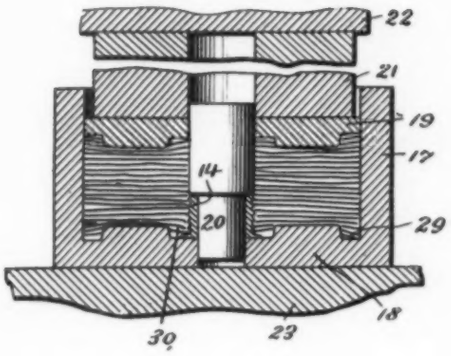


The new gears in question are made out of individual cords that have been treated with a binder. The invention can best be understood by full reference to the drawings that accompany the patent, some of which are reproduced here.

Fig. 2



In the drawings, Fig. 1 is a side view of a gear blank; Fig. 2 is a cross section of the same; Fig. 3 is a vertical section of a fixture or mold used in making gear blanks; Figs. 11, 12, 13 and 14 are diagrams illustrating the crossing of the individual cords whereby additional strength of



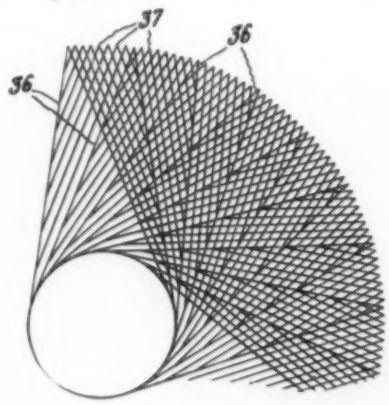
the blank and teeth is obtained.

In carrying out the invention cord made of spinnable textile fibers such as cotton, for example, which may be treated with bakelite or other suitable binder, according to well known methods, and afterwards cut into short lengths is assembled in a fixture and subjected to heat and pressure to consolidate the material and cause the binder to harden and hold the material in compression.

Size of Cord

In general, it may be stated that the cord should not be so small in cross section as to interfere with the proper treatment with the binder or its subsequent handling, nor be so large as to require an undue amount

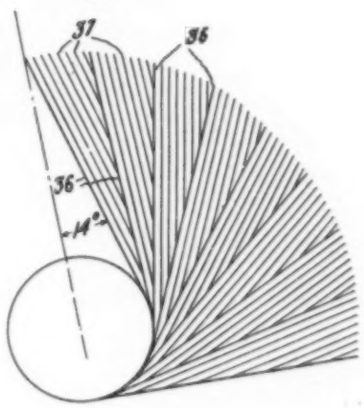
Fig. 11.



of binder to fill the intervening spaces between cords in the finished blank, it being remembered that in a gear of this kind it is the textile fibers and not the binder which impart the strength thereto and also the quiet running properties. Hard twisted cord of the character used in the manufacture of tires for automobiles may be used for this purpose.

10 indicates a gear blank having a thickened rim 11 and a central shaft opening 12. The blank may have a thickened hub as indicated at 13 or it may be omitted. Where such a hub is provided it will usually have a metal sleeve or bushing 14. From Fig. 2 it will be observed that the web 15 is relatively thin, the purpose of which is to permit the rim to yield slightly in

Fig. 12.

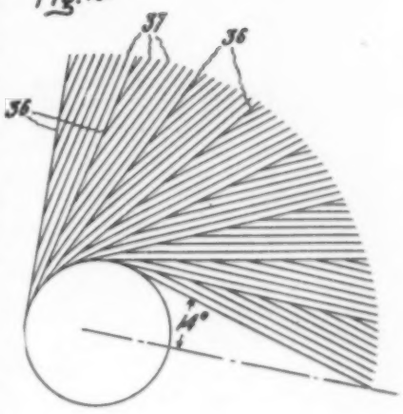


an axial direction, when the teeth 16 which are spirally cut are subjected to undue pressure.

Since the amount of cord required in a blank progressively increases from the hub to the rim, due to the difference of diameter, and since the arrangement of the cord in the gear teeth is important, special distribution thereof is necessary. The cord is first cut into pieces of long, short and intermediate lengths and these are then so stacked that as the distance from the axis increases, so do the number of pieces.

To provide for the thickened hub and rim additional short pieces of cord are provided and located in these regions. To attain the best results, the cords long, short and of intermediate lengths should be so evenly and uniformly spread or distributed,

Fig. 13.



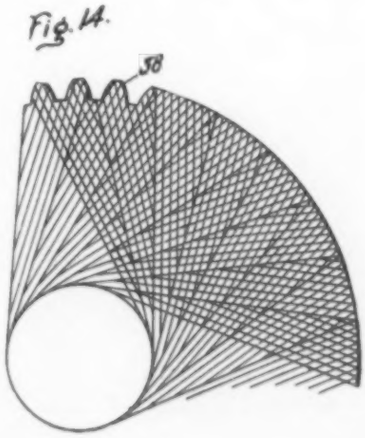
taking into account the contour of the blank, that the density per unit area is approximately the same at every point. The general trend of all of the cords, especially those in the rim where the teeth are to be cut, is radial, with the result of obtaining stronger teeth and better tooth action.

Forming

In Fig. 3, 17 indicates the cylindrical vertical wall of a fixture or mold and 18 the bottom thereof, the upper surface of which is shaped to conform to one of the sides of the gear blank. The top member 19 is vertically movable and its under surface is shaped to conform to the other side of the gear blank. Rising from the bottom of the fixture is a stud 20 over which is fitted the metallic hub or sleeve of the blank. 21 indicates a follower which rests on the upper side of the top member 19. Above

(*Continued on page 86*)

Fig. 14.



Surface Decoration of Pyroxylin Plastics

Superficial dyeing followed by application of pearl essence, gives rise to effects similar to cloisonné designs.

THE decoration of pyroxylin plastic sheets and finished objects is a very important step in the fabrication of these materials, but very little has been published regarding the actual methods in use. Occasionally someone secures a patent in this field, although most of the processes employed are either more or less so-called "trade-secrets," or are the heritage of the good old days.

Pyroxylin plastics, by their very nature, require different treatment for the application of surface decorations, and even the printing processes applied are distinct from the printing upon paper or absorptive material, as the pyroxylin plastics, in common with the casein solids and synthetic resins are quite smooth and resistant to the application of paints, inks and the like.

The inherent beauty of the pyroxylin plastics enables them to be used even without additional decoration. When, however, the natural attractive background of a pearl sheet is used to set off an intaglio design, very striking effects can be secured.

Composites

Artificial pearl decorated pyroxylin plastics have, in the past, been made by producing an inherently decorative sheet of such plastic having fish-scales incorporated therein, and applying this sheet directly over a heavier layer of a differently colored pyroxylin base. Other processes also required compositing or overlaying all of which was not so very simple or easy, although the results obtained were exceedingly beautiful and striking.

Hugo Manovil, of New York, has just patented a method of decorating what he prefers to term celluloid, and the following description is taken from his specification, filed March 10, 1926, and which eventuated into U. S. P. 1,636,523, which issued July 19, 1927. His process includes the following steps.

The method can be employed for decorating a celluloid block or article of any kind, size or shape, and is particularly intended for decorating toilet articles, such as brushes, mirrors, toilet sets, etc.

Dyeing

The object to be decorated, which may be designated as the "base" is first given a colored surface coating. For this purpose, any suitable dye (such as an aniline dye) or any suitable pigment, is thinned with or dissolved in a celluloid solvent, such as ethyl acetate. The thinned coloring liquid is then thoroughly stirred and strained through cheesecloth. Practical experience has shown that when the coloring agent is thinned with acetone or the like, that the color forms little lumps on the base when it is sprayed on, unless certain precautions, such as the stirring and straining above mentioned, are observed.

However, little lumps of color pass through the cheesecloth or form afterwards, and hence the thinned coloring agent is sprayed on the base by an air-brush, operating under a pressure of about thirty (30) pounds per square inch. The purpose of thinning the coloring agent to penetrate the surface of the base, and to form a very durable colored coating.

Pigment colors, such as enamels used on automobiles, because they resist sunlight, etc., are preferable.

The thinned coloring compound should flow about as readily as water, so that it spreads readily and can be readily sprayed. The volatile solvent ingredients of the coloring compound are allowed to evaporate, so that a dry, uniform colored surface is produced on the base.

Experience has shown that if a line design is produced on this colored surface by engine-turning, for example, that the engraving tool causes the colored layer to chip, so that sharp clean lines are not uniformly produced in a large run. The percentage of spoiled pieces is considerable. Hence, it is preferable to protect the colored layer, before engraving the design by a tool which penetrates through the color line into the base, by means of a thin superimposed layer of fish-scale, for example. This protective layer of fish-scale is formed by taking the commercial fish-scale solution, thinning it with a suitable celluloid solvent (like acetone) until the solution flows about as readily as water and then spraying this solution by means of an air-brush operating under a pressure of thirty pounds per square inch. This

(*Continued on page 87*)

Glass-like Plastics From Itaconic Esters

Polymerization similar to that taking place in the formation of aminoplastics leads to transparent products suitable for jewelry, lenses and the like

Since the advent of the aminoplastics, especially of such types as Pollopas, interest has centered upon the production of synthetic materials that, while possessing the transparency of glass would nevertheless lend themselves to plastic molding at temperatures not unreasonably high.

The styrol resinoids have already been discussed on various occasions, but the production of polymerized itaconic ester resinoids on a commercially feasible basis is novel.

EDWARD Hope, of Oxford, England, assignor to Frederick William Attack, of Kingston, Canada, has perfected a process for the manufacture of glass or glass-like objects. (U. S. P. 1,644,131; Oct. 4, 1927).

It has long been known that the di-alkyl esters of itaconic acid can be polymerized to form glass-like masses of high refractive index, but hitherto no commercial method of obtaining the desired result has been described. The results recorded in the literature are extremely erratic and the polymerization is always very slow; for example Anshütz, Berichte Vol. 14, page 2784, states that one preparation completely polymerized in nineteen months. Anschütz stated that he had not yet tried to hasten polymerization artificially by bromine, iodine, etc. Fittig, Annalen 331, page 174, 1903, stated that the polymerization first begins after several months.

Investigations

The most complete investigation appears to have been made by Stobbe and Lippold, J. Pr. Chem. 1914, Vol. 90, page 336, who investigated the action of light on the polymerization of the ester together will the polymerization of styrol. They concluded that both reactions were autocatalytic in character and both were strongly influenced by light. For example, one specimen of itaconic ester kept in the dark for three months was unchanged, while another that was exposed to light became thick after sixty-five days and solid after one hundred and three days. It was stated that temperature has apparently no influence on the polymerization; at any rate the refractive index of the specimen kept for 132 hours in the dark at 100° C. had not altered.

Another sample was kept in the dark for 10 years at ordinary temperatures when it was found to become viscous.

Accelerating the Reaction

As a result of an exhaustive investigation of the conditions of polymerization, Mr. Hope has now discovered that provided anticatalytic phenomena are avoided, it is possible to accelerate the reaction to a remarkable extent by heating and that exposure to light is not necessary to obtain the desired result. While the presence of small quantities of acid is not prejudicial and may possibly be of advantage in some cases, the reaction is retarded if the material is kept in effective contact with certain alkaline substances, e. g. dry quicklime or certain organic bases such as piperidine. Certain samples of ordinary glass containing an alkaline base exhibit the same anticatalytic action. Thus piperidine may be used to stabilize the ester during storage.

The invention further consists in polymerizing the di-alkyl esters of itaconic acid or their derivatives by heating the material while avoiding substantial anticatalytic phenomena.

The reaction may be arrested when the viscosity of the ester has risen e. g. to the viscosity of pure glycerine, and the partially polymerized viscous liquid may be used as a cement after which the polymerization may be completed by further heating the liquid.

The material is also useful for application in thin layers as cement for the purpose of forming compound sheets of glass or other transparent material, especially with the interposition of flexible sheets of cellulose acetate or the like.

Example

Two sheets of glass are united by the aid of this viscous mass as a cement to a sheet of transparent cellulose acetate. Polymerization is then completed by heating the composite sheet for three days at 70° C. when an unsplinterable sheet is produced.

Such a composite sheet con-

(*Continued on page 92*)

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THE CELORON COMPANY, Bridgeport, Pennsylvania
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MOLDING PRODUCTS
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Casein+Furfural=New Molded Product

Combination of the waste from two food product industries yields new and useful plastic material resembling the resinoids in its general properties

ONLY recently one of the large producers of casein plastics has begun advertising casein molding powders. That the larger electrical companies are well aware of the possibilities of the proteinoplastics is evidenced by their entry into the field of molded articles made from casein and the like.

The Western Electric Co. has been working in this field, as evidenced by a recently issued patent, U. S. P. 1,648,179; Nov. 8, 1927, filed June 13, 1924, by Sidney M. Hull. This patent describes in minute detail the production of a moldable casein product which results from the action of furfural on casein.

A few years ago furfural was merely a laboratory curiosity. By reason of the intensive research work carried on, chiefly by the Miner Laboratories, in behalf of the Quaker Oats Co., furfural can now be obtained in tank car lots, so that any process utilizing the waste products of the cereal industries as well as that of the dairy industry has considerable technical importance.

Heat and pressure cause a reaction between the casein and the furfural, somewhat analogous to that occurring when formaldehyde acts on a proteid.

10 to 1

The inventor describes his process as follows:

According to the preferred form of the invention casein or other proteids, such as glue or gelatine in a dry state, are ground to a fine powder and mixed with the required amount of furfural to bring about complete condensation. In forming this preliminary mixture of casein and furfural, there is a great deal of latitude, but a proportion which has given good results is 10 parts of casein to one part of furfural. By varying the amount of furfural used the properties of the final product may be changed and to a certain degree controlled. The ideal condition to obtain optimum properties is to employ proportions of casein and furfural so that after condensation no free furfural or casein will be present. In general the use of a less amount of furfural gives a softer final product.

When the casein and furfural are mixed together they present the appearance of a moistened mass. This mass may be molded into shape under pressure and while in the press, heat being applied for various lengths of time depending upon the nature of the specific product desired. In general the temperature should be between 175° F. and 225° F. and the pressure should also be consistent with the density required in the final product. The duration of heating may be from 10 minutes to an hour. The material so produced is a hard resilient plastic mass, resembling Bakelite, Redmanol and similar materials, and a conchoidal glassy fracture is shown when it is broken.

Condensation

When casein is mixed with furfural the condensation takes place slowly so that sufficient time exists for the satisfactory commercial handling of the material. For instance, a mixture of furfural and casein may be allowed to stand at room temperatures for three or four days before any noticeable hardening results.

The product of the condensation of furfural and casein when produced under heat and pressure is in general considerably more waterproof than other protein-aldehyde compounds. However, in order to increase the resistance to moisture of this product, advantage may be taken of the solvent properties of furfural for a wide variety of materials. For instance, a rosin-glycerol ester may be dissolved in the furfural in the proportion of one to one, and this solution used for the condensation with casein. Using a gum in this form it is spread uniformly throughout the entire mass and renders the plastic quite resistant to moisture. Other materials such as cellulose-esters; various gums and resins, either natural or synthetic; bituminous materials; tung oil and other polymerizable oils with or without being previously heat treated; waxes and the like may be incorporated in the same manner. Other solvents than furfural may be used for dissolving and distributing the waterproofing agents, but when other solvents are used it is preferable that they be inert, organic, violatile and miscible in all proportions with furfural. Such solvents may be acetone, benzene and its homologues, or other well-known organic solvents.

In forming a compound of the type described, inert fillers may be incorporated for the purpose of reducing the cost of the product and otherwise changing its

(*Continued on page 93*)

Resinoids in Stencil Sheets

CLOSELY following on the heels of a series of patents on so-called "dry stencils" for use with duplicating machines of the "mimeograph" type, in which the use of cellulose esters and starch esters are described, the A. B. Dick Co., on the application of Alex Brooking Davis, has been granted another such patent, this time on the use of a resinoid, suitably modified for the purpose.

In the patent, U. S. P. 1,649,058; Nov. 15, 1927 (Appl. March 26, 1924) the inventor states that a special type of glycerol-phthalic-acid resinoid forms the basis for the material. This is dissolved in acetone, and castor oil, chlorinated naphthalene, Japan wax and paraldehyde are added. The further addition of cellulose nitrate dissolved in ethyl acetate and acetone is optional.

A porous fibrous paper, such as Japanese Yoshino paper is drawn over the surface of this solution and dried.

A statement relative to a co-pending application covering the use of rubbery and elastic resinoids for the same purpose is made.

Dr. Redman and Research

DR. L. V. REDMAN, Director of Research of the Bakelite Corporation and one of the pioneer research workers in the phenol resinoid field, was one of the speakers at a Saturday luncheon held at the Town Hall Club under the auspices of the American Institute of Industry.

So rapid have been the advances in this young and vigorous industry, that the lapse of even seven years witnesses a complete revolution.

Research has been the Keystone on which the Bakelite Corporation has built its structure, one which promises to endure and improve in spite of the onslaughts of competitors.

TECHNICAL ABSTRACTS
AND PATENT REVIEW

Resinoid. Phenoplastic from dyestuff. Boris N. Lougovoy, assignor to Ellis-Foster Co., Montclair, N. J. U. S. P. 1,648,852, Nov. 8, 1927.

As examples of methods of preparation of the dyestuff resin the following are given:

Example 1.—56.4 parts by weight of carbolic acid and 41 parts of side-chain chlorinated toluol (specific gravity 1.34) were mixed and upon gentle heating an exothermic reaction took place and hydrogen chloride was evolved. Upon completion of the exothermic reaction the resulting solution was heated to boiling for 2 hours under reflux condenser. During the first hour of the heating hydrogen chloride continued to be evolved. A dyestuff of a somewhat reddish color, as a syrupy substance was obtained. Toward the end of the boiling water was given off as evidenced by a spitting and crackling in the reaction vessel. A dark red brown semi-liquid product was obtained, the yield of this product being up to about 155 per cent of the carbolic acid taken. This product was steam distilled to free it from a small quantity of free carbolic acid still present, the loss being 2 per cent. After this treatment the product obtained is a tough semi-solid, soluble in organic solvents such as alcohol, acetone and benzol. Its properties resemble those of a dye belonging to the oxycarboquinonic series such as the derivatives of the triphenylmethane group. Upon prolonged heating at an elevated temperature it gradually hardens into an infusible, insoluble brittle resinous body. The product after steam distillation was then boiled with 25 per cent of its weight of aqueous 40 per cent formaldehyde solution (i. e. 10% of actual formaldehyde, in solution, based on the weight of the intermediate or dyestuff) under a reflux condenser for 1 hour. During the boiling the solution separated into two layers, the lower layer being a dark viscous mass when hot which hardened upon cooling to a lustrous dark somewhat tacky resin having a melting point of between 40 and 50° C. The resin obtained is soluble in organic solvents such as alcohol, acetone, benzol and the like.

A molding composition was prepared using the above resin by dissolving the resin in an equal quantity of alcohol and 10 per cent hexamethylenetetramine was subsequently dissolved in the alcohol solution. A quantity of wood flour equal in weight to that of the resin was impregnated with the alcoholic solution and the composition was then dried in a vacuum dryer. Upon submitting the composition to a hot molding operation a thermo-rigid molded article was obtained which exhibited all the desirable properties required of a commercial molding composition such as flowability, finish, etc. A molded article prepared from this composition when compared with a molded article prepared with a phenol-formaldehyde condensation product was found to have one to one and a half times the transverse strength of that of a phenol-formaldehyde resin.

Spectacle frame blanks. William P. Devine, assignor to Harris King Halikman, Boston, Mass. U. S. P. 1,649,516; Nov. 15, 1927.

1. The herein described process of manufacturing compressed spectacle frame blanks which comprises forming an article of plastic material of a cross-sectional contour approximately like that of a spectacle frame blank, then allowing it to harden by exposure to the air for a substantial period of time, then heating the article to render it plastic, then placing the plastic heated article on a pair of supports extending through the tubular portions thereof, then placing the article and the tubular supports in a forming die and subjecting the same to pressure and heat, then causing the article to be cooled, then removing the article from the supports and the die and sub-dividing the same into a plurality of sections, each of which constitutes a spectacle frame blank.

2. The herein described process of manufacturing compressed spectacle frame blanks which comprises placing an article of seasoned plastic material of a cross-sectional contour approximately like that of a spectacle frame blank and comprising a pair of tubes and a crossbar joining them together and integral therewith, in a die with a supporting arbor inserted in each of the tubes, and then subjecting the said article to pressure and heat.

Removal of diphenylamine from smokeless powder (Cellulose nitrate). Durain C. Butts, assignor to Hercules Powder Co., Wilmington, Del. U. S. P. 1,650,689; Nov. 29, 1927.

Old smokeless powder is often worked up into lacquers and plastic materials. The presence of the diphenylamine in such powder, added for purposes of stabilization, is objectionable for use in lacquers and the like.

Patentee removes the diphenylamine by treating the powder with boiling isopropyl alcohol. While this effectively dissolves the diphenylamine, it merely swells and penetrates the powder grains.

Reducing Viscosity of Cellulose Nitrate. Paul C. Seel, assignor to Eastman Kodak Co., Rochester, N. Y. U. S. P. 1,648,509; Nov. 8, 1927.

Pyridine is employed to treat waste cellulose nitrate material such as pyroxylin waste, film scrap, etc. This consists in making a solution of 20% of pyridine in water and allowing the solution to act on the pyroxylin. Alternatively a solution of 10% of pyridine in ethyl alcohol may be used; or a solution consisting of water, 5% of pyridine and 20% of methyl alcohol (methanol). The time required is 24 hours at room temperature. The pyroxylin is then thoroughly washed with hot or cold water to remove the pyridine. The product is suitable for lacquers.

RECENT BOOKS

A Guide to the Literature of Chemistry. By E. J. Crane and Austin M. Patterson. New York, 1927. John Wiley & Sons. 438 pages.

Even the most expert research chemist as well as an engineer of long training in the chemical arts and industries is frequently much puzzled when confronted with the problem of ascertaining rapidly the approximate state of an art regarding which he receives an inquiry.

The general scope of chemistry is so large, and its ramifications so complex, that no individual can hope to attain complete mastery of the subject, but must, perforce, content himself with a thorough familiarity of the art with which he finds himself most closely connected.

Thus, for example, a chemist associated with a paint and varnish concern may reasonably be expected to know the business, and to be conversant with the sources of information of this particular art, and especially with the books and periodicals on the subject. In consequence, when a new process, or novel product is proposed, he has a fair knowledge of where to look to see if the product has not, perhaps, been anticipated by some publication.

However, if the product should fall into an entirely different class, as for example if it should involve the production of some organic product, such as pyroxylin or the like, he may have to grope in the dark for quite a while until he becomes familiar with the sources of information on this particular substance.

Trained searchers of the literature, and of patents, are by no means numerous; and the average industrial chemist does not know very well how to go about collecting facts and information on a subject not directly in his daily line of work.

A reliable guide to the tremendous mass of chemical and technological literature has long been desired. In the volume under discussion, "A *Guide to the Literature of Chemistry*" there is at last provided, in comprehensive and splendidly arranged form, a hand-book that will very materially assist any one who is confronted with the problem of getting together facts and data on any part in any way related to chemistry. The work is the result of the collaboration of the present editor of Chemical Abstracts, Dr. E. J. Crane, and the former editor Dr. Austin M. Patterson.

Chemical Books

The book begins with a concise outline of the general purpose of searches, the obstacles encountered, and a plan of the book, so as to enable its use with a better understanding of its possibilities.

The second chapter calls the attention of the reader to the larger encyclopedic works on general chemistry and industrial chemistry, such as for example Thorpe's Dictionary, Ullmann's Enzyklopadie der technichen Chemie, and the like. Each of the books is briefly described so that the reader would have a fair idea as to whether the information sought might be located by a perusal of these works.

Periodicals

The third chapter deals with the highly important subject of periodicals. After a fifteen page introduction of the subject, the work lists the current journals of greatest chemical and technological interest, arranged according to general subjects. Each important periodical is described and the type of matter covered by the same discussed. Especial consideration is given to the abstract journals, as by looking through these, especially such as have collective indexes, a great deal of ground can be covered in a relatively short time. A resume of the books on patent law is also included. A description of the Scientific Library of the U. S. Patent Office and the methods of securing specifications of American and foreign patents is also given.

Chapters are devoted to the various bulletins, circulars, etc. of the various governmental and other departments; as well as the theses of university students; and various bibliographies, trade literature and similar sources of information of discussed.

Use of Indexes

A very important chapter is that on Indexes, Chapter VI, which goes into great detail as to the proper construction and use of indexes; as well as a description of the collective and other indexes to technical litera-

(*Continued on page 88*)

Laminators Complain Before Tariff Commission

Unfair competition from imported products charged by Bakelite Corporation and domestic manufacturers of laminated materials

EVIDENCE was submitted to the United States Tariff Commission in a hearing at Washington, starting Monday, January 30th, supporting the complaint of the Bakelite Corporation against importers charged with bringing into the United States synthetic phenolic resins, in violation of the Tariff Act and patent rights.

In addition to the Bakelite Corporation, four manufacturers of the laminated material have complained to the Commission of unfair competition resulting from the importation of insulation materials resembling Bakelite materials in chemical composition.

Foreign Origin

Representatives of importers objected to submission of samples of laminated material sold as Bakelite by the Insulation Corporation of America on the ground that this company was no longer in business, but the Commission overruled this objection. The imported sheets contained a mark showing they were made in Germany.

Results of Analysis

Counsel for the Bakelite Corporation and the five independent laminators authorized to manufacture this material in the United States show by chemical analysis that the imported stock corresponds with genuine Bakelite material.

Witnesses for the Continental Fibre Company, Newark, N. J., the Formica Insulation Company, Cincinnati, O., National Vulcanized Fibre Company, Wilmington, Del., and other fabricating concerns injured by the practices complained of told how they were unable to meet with the foreign prices which were far below their own cost of production.

This branch of an American chemical industry has an annual output in laminated resinoid materials in excess of $10,000,000 in the United States, it was estimated. Some of its largest consumers, including General Motors Corporation, have purchased the foreign material, to the exclusion of their own, it was claimed by W. R. Yates of the Continental Fibre Company. Another witness stated that the Universal Insulating Company, with which he had been identified, was forced out of business in March, 1927, because he refused to deal with the importers.

The Commission was asked by counsel for the Bakelite Corporation to make an early recommendation to President Coolidge to prevent by embargo further importation of phenolic resins which are causing injury to the market for Bakelite laminated materials.

A Question of Law

Albert Mac C. Barnes, New York attorney for the Corporation urged the commission to act upon the law in the case and not seek to determine the extent of injury caused by the products of European chemical manufacturers.

"If the commission finds there is a fraction of one percent of imported laminated material corresponding to the Bakelite materials in American market it should be excluded," Barnes urged. He pointed out that because of the Treasury department classification as insulating material, it is virtually impossible to determine the extent of illegal importation.

Witnesses for the Bakelite Corporation testified that the difference in price between the foreign made material and Bakelite laminated products, and the similarity in appearance made it impossible for them to compete with the importers.

J. A. Post Van der Burg, a New York importer, offered samples which he bought in the New York market showing that they were "made in Germany."

Mark of Origin Obscured

J. A. Poster, president of Micarta Fabricators, Inc., of New York, stated that while the country of origin was shown on the original sheets, the material could be cut so that the parts cannot be distinguished from Bakelite material.

Joseph Spring, of New York, representing importers of the material, sought to show that the radio industry, which is a large user of Bakelite materials, has been using less of the laminated sheets for panels lately. He pointed out that this was more responsible for dwindling sales than competition with importers.

Representatives of the trade, however, testified that other uses for laminated in the set more than made up for the loss in replacement by metal and wood. With the growth of the radio industry, the number of Bakelite front panels used has remained stationary, it was stated. Foreign materials for this purpose can now be purchased in New York, evidence disclosed.

Mr. Sprong contended that the volume of this business is small and that the German and other importations are inferior to genuine Bakelite sheets, accounting for the difference in prices.

"Die-Casting Plastics

As far as the radio industry is concerned, it appears quite certain that many of the smaller parts required will be made by the familiar method of die-casting of the plastic material. This process, sometimes spoken of as extrusion, in reality consists in the melting of the insulating material in a cylindrical vessel from which it is extruded through a valve into a hollow form in which it hardens, much after the manner in which metals, as aluminum, zinc-alloys, etc., are die-cast.

This method of die-casting of plastics is however only applicable to such thermoplastic materials as exhibit a very high softening point, and which lies so far above the temperatures at which the articles are to be used, that no softening or yielding of the same during use will be assured. In working with this method the so-called "molten" plastic material must not really be fluid, for otherwise, it would run out of the form, and would be liable to form blisters; on the other hand it must not be too viscous at the casting temperature, as this would make the process too slow, would tend to plug up the extrusion die, and would not completely fill the molds.

Trolite

Such considerations severely limit the available die-casting plastic materials, and it is not at all surprising that there is only one really good plastic of this type on the European market. It is called *Trolite*, and is made from *cellulose acetate*. In some respects it is not a perfectly ideal insulating material, and lacks the advantages of the phenoplastics, as it has a softening point entirely too low for high tension insulation. However, for low tension work the use of *Trolite* has grown into a really formidable industry, and the demand for *Trolite* molded products is so great that its failure for high tension work does not in any way act as a deterent for its wide and continued use.

Thus far, no other material

that will work like *Trolite* has been discovered, but active research to develop a phenoplastic or the like, permitting diecasting operations such as those described, is under way, and some startling results may soon be published.

From the German viewpoint, the working together of industrial plants with the scientific institutions has produced some very valuable results. The commercial producers and technologists, however, will in some cases have to revise the work of the research organizations, so as to lead the way to commercially valuable results. Many products that in the laboratory yield wonderful results are entirely too expensive for all-round application.

Many of the well known technical insulating materials, while most excellent in themselves, are in reality "too good" for many uses, as they have far greater electrical and mechanical strength than is really required. The new process, which makes it possible to employ old newspapers and other waste paper, for the production of a serviceable and inexpensive molded insulation, has, therefore, much promise of success.

Gear Molding Methods

(*Continued from page 73*)

the follower is the upper platen 22 of a hydraulic press and the fixture as a whole is seated on the lower platen 23 of the press. The parts are so arranged as to prevent relative rocking movement one on the other to the end that the finished blank will have the proper thickness at every point and the side faces of the rim will be exactly parallel to each other. By making the side faces parallel and the proper distance apart machine work thereon is avoided and the advantage of the glasslike surface due to the binder is retained.

Owing to the multiplicity of cords used in the construction of a blank, it is difficult to illustrate the exact arrangement in any one figure.

Placing the Cords

In Figs. 11 to 14 there is illustrated diagrammatically the best embodiment of the invention as regards the distribution of the various cords. In these figures as in the others, the trend or general arrangement of the cords is radial but instead of being truly radial in position the longest cords 36 form an angle of approximately 14° to a radial plane and the shorter cords 37 of each group extend substantially parallel to each other and to the longest cord. As will be seen, the cords 37 get shorter and shorter toward the rim. In assembling, a layer of cords such as shown in Fig. 12 is placed in the fixture and this is followed by a layer of cords such as is shown in Fig 13 with the result that the cords cross one another at acute angles. By following this procedure layer by layer the cords of one layer will cross those of adjacent layers both above and below as indicated in Fig. 11 and each cord will be bonded to other cords and be securely anchored thereby.

Reference has been made to the 14°relation of the cords. This is due to the fact that side faces of the teeth 38 have substantially this angle. If the angle of the teeth is changed the relation of the cords can profitably be changed to conform. The radial trend of the cords in the teeth, the crossings therein and their anchorage in the rim and web substantially add to the strength of the gear teeth and at the same time permit of a slightly greater degree of flexibility under shock which is highly desirable. The crossing of the cords also straightens the hub region to

the end that the blank may be given a forced fit on its shaft.

By treating the cord with a binder before attempting to assemble or stack the same into a fixture to form a blank the substantial advantage is obtained that the minimum amount of expensive binder is required, an amount which is less for a blank of given material used. I attribute this to the fact that there are no small pockets or interstices as in woven material where the threads cross which collect and retain the binder. Also to the fact that there is a better distribution of the fibers where independent cords are arranged side by side than where one half of the fibers extend in one direction and the remainder at right angles thereto and are tightly interlocked as in woven fabric.

By using individual cords as distinguished from a woven fabric and arranging them in the manner disclosed, higher pressure than has heretofore been considered suitable may be used, with the result that the product is more dense, which contributes to longer life.

It is evident that the distribution of the short pieces of binder treated cord may be considerably varied from that shown and still be within the scope of the invention. Care should be exercised, however, to arrange the pieces of cord in planes perpendicular to the shaft so as to obtain the necessary strength.

Decorating Pyroxylin

(*Continued from page 74*)

fish-scale layer may contain some celluloid. Thus the commercial fish-scale solution may be thinned with a celluloid lacquer.

This first coating of fish-scale penetrates the color to a certain extent, and hence it hardens the colored layer. This is allowed to thoroughly dry and harden before the engraving operation. This coating of fish scale also

(*Continued on page 89*)

Essential Books

* *

Plastics and Molded Electrical Insulation.

Emile Hemming. 313 pages. Illustrated. $6.00.

Very special care has been taken in the preparation of the chapter on molded insulation. Contains hundreds of references to plastic and composition products and their utilization in industry.

* *

Casein and Its Industrial Applications.

Edwin Sutermeister. 296 pp. Price $5.00. Illustrated. 1927.

Eleven authorities, many of them specialists in this field, have contributed to this volume. "Casein Plastics" is from the pen of Dr. Geo. H. Brother.

* *

The Chemistry of the Natural and Synthetic Resins.

T. Hedley Barry, Alan A. Drummond and R. S. Morrell. 196 pp. Price $5.50. 1926.

The work of three English chemists, who are recognized authorities on this subject, one of vital interest to the Plastics Industries.

* *

Celluloid.

Its raw material, manufacture, properties and uses.

Dr. Fr. Bockmann. 188 pages. 69 illustrations. $3.50.

In this book, the raw product, cellulose and its properties are thoroughly described. Other raw materials and methods of rendering them more plastic also receive attention.

* *

Pyroxylin Enamels and Lacquers.

Samuel P. Wilson. 213 pages. Illustrated. $3.00

An authoritative work dealing with the materials and manufacture of pyroxylin solutions and with their application in the industry.

* *

Synthetic Resins and their Plastics.

Carleton Ellis. 514 pages, illustrated. $8.00.

The book will serve as a guide and prove a stimulus to the numerous investigators and practitioners in the field of artificial resins. The section on plastic molding is an especially valuable feature.

* *

Any of the above can be obtained by writing to

Book Department
PLASTICS
471 4th Ave., New York

Book Review

(*Continued from page 83*)

ture available in the various libraries of the United States and Europe.

Needless to say the question of nomenclature is fully covered, as many materials are known by widely divergent names, and a proper search can only be accomplished by one thoroughly conversant with this phase of the subject.

A short chapter on the various larger libraries follows.

Art of Searching

The proper procedure for the making of a search along chemical and technological lines is then given. This is followed by a very interesting compilation of the actual experiences of others, giving in detail the methods considered to be of particular value in certain lines of endeavor.

Then follow the appendixes to the book proper. These are in reality as valuable as the main part of the book. The first is a comprehensive alphabetic list of bibliographies of articles dealing with chemical literature from 1907 to 1926. A 14-page list of all the common abbreviations used in English as well as foreign technical publications and a list of American Libraries of interest to Chemists comprises appendices 2 and 3. Appendix 4 covers a bibliography of lists of periodicals. As a means of checking the various publications in any particular field this is very interesting and valuable.

Appendix 5 deals with various scientific and technical organizations that publish reports, transactions, bulletins and the like, in which information may be found.

Appendix 6 is virtually a reprint of the list of periodicals abstracted by *Chemical Abstracts* and gives the abreviations used for these journals. This enables the user of this work to ascertain instantly what any references found in chemical literature means. This is often very important, as many journals have names closely resembling each other. This list alone, in small type, covers 64 pages.

A list of chemical book dealers and publishers is also part of the book as it is often an object to get together a special library on a given subject.

List of Books

An important part of the work is a select list of text books, arranged by the classes commonly used in Chemical Abstracts, which is followed by an index, the total section covering 71 pages.

The entire work closes with a complete and comprehensive index. The list of periodicals also gives the name and address of the publishers, as well as their frequency of appearance and subscription price, etc.

It can safely be stated that the **Guide to the Literature of Chemistry** is a most valuable addition to the art, and we feel reasonably sure that all of the subscribers to our magazine who are interested in compiling information for their own use, or who are involved in litigation relating to a product or process will find much inspiration and leads to information in this work. The authors are to be commended on the completeness with which they have covered the subject.

German Insulating Materials

(*Continued from page 71*)

tion. Most of the laminated hard-paper products thus far offered to the trade would not permit of the insertion of eyelets and other metallic elements. The new product, however, permits of this being done.

Important Development

The new process may well prove a turning point in the line of molded products, as it will produce finished articles that exhibit, in all directions, the mechanical strength of the hard papers. Even the most complicated shaped article can be produced from this new material, and many objects can now be made in one pressing operation that formerly had to be cut from sheets of laminated material.

As already stated the patent applications on the new products and process have not as yet led to the grant of patents, and considerable time will probably elapse before this occurs. The writer has however been given an opportunity to witness the new process and to see the products, and to participate in the tests herein described. He is convinced that much can be expected from the improved molding material.

Some of the actual articles made by the new process are radio panels which were directly molded with the desired "jack-frost" or crystalline frontal surface, and which had mechanical properties, such as ready workability, that was quite markedly better than anything of the type previously made. Furthermore, the cost of such panels was about one-half that of the better grades of laminated panels.

Decorating Pyroxylin

(*Continued from page 87*)

modifies the original color of the colored layer and this is also done by subsequent coatings. For example, if the enamel originally used has a deep blue color, the addition of a suitable number of layers of fish scale, as later disclosed, changes this blue color to a "smoke" blue or cloudy blue, which is highly desirable.

Even if the white celluloid base is not colored, it is desirable to form a fish-scale coating before engraving, because this produces a desirable color effect.

In addition to the intaglio design on the celluloid base, a surface design might be formed by painting or the like, and this surface design could be accentuated and made to stand out from its background by the method herein mentioned. Thus, a floral or leaf design could be formed by painting on the original white base or on the colored background.

Spraying

Experience has shown that it is very difficult or impossible to apply the ordinary fish-scale of commerce, even when it has been considerably thinned, by means of a brush, without showing objectionable streaks due to the movement of the brush. Likewise, experience has shown that if the celluloid article is dipped into a fish-scale solution, even after it has been thinned, that the air bubbles which are present in the solution prevent the formation of a uniform coating, because such air bubbles produce breaks or marks in the coating which are plainly visible and which greatly injure its ornamental appearance. This is especially true when large, non-spherical objects are being treated, although this may not be true in coating small, smooth, spherical beads. In any event, it would be very difficult to coat the engraved lines by brushing or dipping, and to produce uniform work, free from marks due

to bubbles. However, by making the solution sufficiently thin and by spraying with sufficient pressure, a very thin, firm and uniform coating can be produced, free from all air bubbles, and of a uniform pearly appearance.

After the engraving or other decorative step has been performed, a second thin and transparent coating of the thinned fish-scale solution previously described is sprayed and by an air-brush, under a pressure of about thirty (30) pounds per square inch. The fish-scale solution used for this coating and for subsequent coatings is preferably thinned with a suitable celluloid solvent, such as commercial acetone, and it does not have any dissolved celluloid therein, although I do not limit my invention in this respect.

Four thin and transparent coatings of fish-scale solution are preferably formed by spraying under the conditions before mentioned, upon the engraved surface, each coating being allowed to dry and harden by the evaporation of the volatile solvent, before the next coating is sprayed on. Experience has shown that the nacreous effect is much enhanced if the pearly coating or surface composed of fish-scale is formed in a plurality of layers.

Contrast

The lines of the original design are thus accentuated in contrast to their background, so that the design has an appearance of a number of separated and sharply defined lines, raised from the base of a pearly appearance. The entire surface is also given a pearly contrast between the surface layer as a whole and individual lines of the design, so that a cloisonné effect is produced.

The fish-scale coating thus formed is protected by spraying thereon a plurality (preferably about four or five) coats of celluloid lacquer, said lacquer consisting of celluloid dissolved in a suitable volatile solvent. This is done by an air-brush operat-

ing under a pressure of forty to fifty pounds per square inch, and each coat is allowed to dry and harden at room temperature before the next coat is sprayed on. The first protective coating of celluloid should not penetrate the fish-scale coating to any substantial extent, because this would injure the clearness of the design and the cloisonné effect, and even destroy it. Celluloid lacquers having low penetrative power are well-known and are used for protecting the enamel on automobile bodies, and hence I need give no further description thereof.

Buffing

The celluloid coating thus formed is then preferably buffed so as to render its surface smooth and to make it very thin. Of course, this coating is quite transparent. Experience has shown the final lacquer coating, as well as the previous pearly coating, tend to be deposited more heavily on the engraved lines than on the smooth background of the design. The buffing operation makes the ornamental surface smooth and planar. The smooth surface is now polished with a suitable oily compound to give a glass finish, like real cloisonné.

Hence, the finally completed article (assuming that the celluloid block has a white color) has a cloisonné design appearing in contrast to a colored background. The lines are very sharply defined and appear to stand up from the ornamented surface and the entire design is readily visible and has a general pearly effect.

My invention is not restricted to providing a colored background for the design because an intaglio design formed in a white surface can have the lines thereof accentuated and made to contrast with the background of the design by using the method previously disclosed.

Itaconic Ester Glass

(*Continued from page 78*)

sists of five layers. Further layers may be present e. g. seven if desired.

The glass may be reinforced by wire or the like if desired.

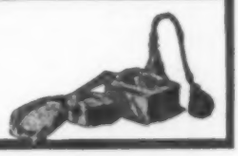
Again the partially polymerized ester may be moulded into objects for optical or other use and the polymerization may be completed after moulding when a hard transparent vitreous article is obtainable which closely resembles ordinary glass in appearance and physical properties. Or lenses and similar objects for optical purposes may be made from the previously moulded mass.

The ester or partially polymerized ester (or esters) may be used as a binding agent with which filling materials may be incorporated, or colouring materials may be added and bodies may be shaped from the masses so formed.

It should be understood that the expression "heating" refers to a temperature which is sufficient to effect the desired polymerization to an adequate extent within a comercially feasible time, e. g. in most cases it will be necessary to heat up to about 60° C. but a higher temperature is advisable. The ester reaches the viscosity of pure glycerine after heating to 110° C. for 15 hours. The product sets to a glass-like mass in about three days but when making unsplinterable glass it will not be necessary to heat to such a high temperature, since the final stages of the polymerization will be completed while the article is in storage or even in use.

The partially polymerized ester may be dissolved in an organic solvent such as chloroform and the solution may be used to cause adhesion between objects e. g. by painting the surface with the solution and allowing the solvent to evaporate.

Accessories
For Toilet Articles



Casein Hardened With Furfural

(*Continued from page 80*)

properties. A satisfactory manner of introducing the fillers into the compound is to grind them with the casein or mix them in in any satisfactory manner, before the admixture of the casein and furfural. As an alternative when conditions and the type of materials used might require the furfural and casein might be mixed first and the mixture kneaded with the filler so as to obtain an even distribution throughout. Inert materials which may be used satisfactorily in this connection may be slate dust, magnesia, infusorial earth, wood flour, asbestos fibre, mica dust and other similar materials.

As an example of the foregoing, a composition which would incorporate the main features of the invention as described above, may be produced in the following manner: 50 parts of finely ground casein are thoroughly mixed with 40 parts of finely ground slate dust and the whole intimately mixed with 5 parts of furfural in which has been previously dissolved an equal weight, (5 parts), of a rosin-glycerol ester. The resultant moist plastic mass is then molded under 2500 pounds pressure per square inch with simultaneous application of heat at 212° F. for about 30 minutes. The material so formed is a hard, dense substance, resembling natural slate in appearance, but lighter in weight, possessing considerable resiliency and a fair degree of mechanical strength.

The particular features of importance in the invention are that the molding time is much shorter than for other protein-aldehyde compounds, and articles can be molded to form, there being practically no shrinkage or distortion. The manufacture of molded articles from, for instance, casein and formaldehyde requires sometimes as much as a month's time and then additional time is required for drying. Articles can be molded in the manner and from the materials disclosed herein in two hours; and since the water evolved during the chemical reaction is the only water present, and this is very small, no time is needed for drying. The material formed from the condensation of casein with furfural on account of its comparatively slight hygroscopicity may be employed as an electrical insulator, or for fabricating articles which are preferably resistant to the passage of electricity. In general the material may be employed to fashion articles which are usually made of bone, horn, ivory, celluloid or the like.

Upholstery Panels

J. A. Wilson makes an upholstery panel by coating a sheet of pressed paper pulp with a pyroxylin enamel, followed by the molding of the panel by passing the same through a roller or in a press so as to give it the appearance of artificial leather; or of imprinting thereon ornamental design. The product is more durable and much cheaper to make than by the gluing together of a card board sheet with artificial leather or coated paper. (U. S. P. 1,643,400; Sept. 27, 1927).

MOLDED PRODUCTS

Devoted to the purchase, further use and merchandising of all manner of molded parts

Vol. 2 FEBRUARY, 1928 No. 2

Reconciling Style With Simplification

How to retain the advantages of simplified practice while profiting from the popularity of bright colors is explained by an expert of the Bureau of Standards

RAY M. HUDSON, governmental authority on simplified practice, writing in the Monthly News Bulletin of the Bureau of Standards' Commercial Standards Group, says:

"Current demands for better quality, more style and color—also for more variety in products, are natural consequences of greater individual prosperity. They are among the first evidences of the arrival of a higher standard of living, and as such are not to be deprecated."

Variety Brings Problems

"It is recognized that demands for greater variety often add to manufacturers' problems by increasing unit production costs, expanding inventories and by requiring greater sales effort to secure satisfactory turnover from the more diversified line. Merchants similarly encounter problems of increased inventory and reduced turnover when stocks become too highly diversified."

"The problem therefore is to 'keep in step with style' and yet retain the advantages inherent in manufacturing and selling a simplified line. This can be done by regularly reviewing the outward movement of the goods, group by group, class by class or line by line; in other words, continually studying their relative rates of consumption. Studies in various industries show that as a rule 80 per cent of the business comes from 20 per cent of the varieties offered and that the other 80 per cent of the line which brings in only one-fifth of the business often absorbs the profits on that 20 per cent of the line composed of the proven 'best sellers'."

"Frequent analysis of stocks or lines to determine what items have passed out of the 'best-seller' class will enable both manufacturer or merchant to keep stocks trimmed to the minimum of variety consistent with service and satisfaction to their trade and to themselves."

Simplification Is Concentration

"Simplification is primarily a commercial program or policy. It means concentration of production and selling effort on varieties in most common or general demand. It is easily seen that in some classes of goods the simplified line of 1928 or of 1929 may be radically different from that of 1927."

UNDER the caption "The Magic of Color", a well known washing machine manufacturer says:

"America is today entering a color renaissance. Women are conscious of the vogue for color. . . . . Go into any department store and look at the house furnishing goods department, study the commodities that are shown in colors and you will get a revelation. You will find a varitable riot of colors . . . you will find hundreds of items brilliantly finished in color. There is no question, therefore, of the beauty and magic sales power of color."

Poiret, famous Parisian designer, has selected the color combinations for this company's washing machines. Its six authorative styles are those which women will demand this year in their wearing apparel.

"Simplification means the elimination of the slow-moving, the seldom-wanted, the little-called for. It is a process of reducing numbers—of discontinuing unnecessary or superfluous varieties handled."

A phenol resinoid paper cup holder sold by Vortex Mfg. Co. This specimen is orange and should provide a "splash" of color at the fountain.

"A manufacturer or a merchant who applies simplification has a better chance of keeping step with style, or of meeting the public's demand for more art in industry, than one who does not, for the former has less to throw overboard or liquidate, when styles change or living standards advance."

"Those who have applied simplification point out its profit-making values, and especially its contribution to greater and sustained purchasing power through the savings it produces. These savings result from the elimination of those wastes found in unwarranted diversification, such as excessive inventories, idle investment, greater cost-to-carry, slower turnover, rapid obsolescence, and unnecessarily decreased profits."

Color in the Kitchen

Follow two recent examples of the use of phenol resinoid materials to satisfy the public's craving for the brightly colorful in their contacts.

To illustrate his theme, "The Advance of Color" (MOLDED PRODUCTS, Nov. 1927) the writer described some aluminum ware with brightly colored translucent handles. The latter were said to be casein solid. Information since to hand is that handles of "Formite" a transparent phenol resinoid of British manufacture are also being used.

That wonderful kitchen convenience, the electric refrigerator, is now in the throes of the color fever. It also has joined the "big parade" of the "colored wagon." As already noted (MOLDED PRODUCTS, August 1927) certain models of the General Electric Company's appliance are provided with phenol resinoid door strips. These must needs be colored to harmonize with the color of the shell and general scheme of the kitchen.

An interesting example combining those two well marked modern tendencies,—the infiltration of color and the replacement of the metal by the molded part—is the molded paper-cup holder for use on soda fountains. According to the Vortex Manufacturing Co., who are marketing them, a brisk demand for these custom-molded phenol resinoid holders is expected and for two reasons. Firstly, they lend a splash of color to the fountain and secondly they cost less than metal holders.

Metal Wanes at the Fountain

While possessed of a degree of toughness adequate for the rough usage it may receive, the molded holder has these advantages over the plated metal article—its unprotected surface is unaffected by the continual handling and cleaning or by fruit acids present in many of the beverages dispensed. As sanitary as metal, the molded resinoid holder is much lighter—a point not to be overlooked when breakage of glass table tops is liable to occur.

In the same connection the reader is referred to the article "Soda Fountain Developments" in MOLDED PRODUCTS for June, 1927.

The Up-to-date Safety Razor

ALTHOUGH Bernard Shaw can still affect the bearded chin with impunity this is essentially a "beardless age." The apparatus necessary to maintain this state of facial affairs has long been a fertile field for the application of plastic materials.

Pyroxylin plastics may form the "scales" (handle coverings) of the so-called straight razor. The same materials, the casein solids and transparent forms of phenol resinoid may be pressed or machined into handles for shaving brushes. Even the shaver's creams and lotions may come in pyroxylin plastic collapsible tubes or in tubes or vials provided the phenol resinoid caps and covers.

No need to detail the reasons for this—sanitariness, permanent, pleasing appearance, and ready workability sum up the situation.

More than any other factor, the efficient safety razor has contributed to the disappearance of the beard. Required in large numbers and at compet-

This Hiscox Shav-Rite razor has a handle molded in colored Durez.

(*Continued on page 106*)

How to Design Metal Inserts

Correctly designed inserts can reinforce and simplify the construction of molded parts. An expert presents this lucid discussion.

By W. F. Lent

Asst. Supt. Cutler-Hammer Mfg. Co.

MOST users of molded parts are familiar with moldings into which members with threads, holes, projections, etc. have been embedded. Such embedded members are known as inserts. It is the remarkable facility with which these inserts may be incorporated that is so outstanding a feature of the molding process.

Generally an assembly involving molded parts may be simplified and improved by the use of inserts for fastening on other members. For example, the knob shown in figure (1) is provided with a female threaded insert for attachment to an electric toaster. Without an insert the knob would be held on by a bolt and nut, leaving the unsightly head of the bolt exposed to view.

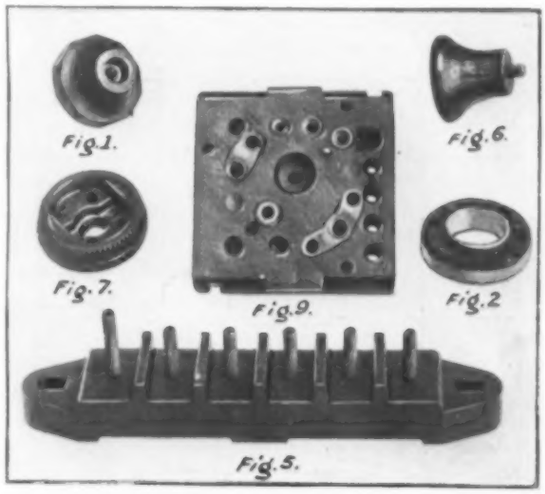


Fig. 1, toaster knob with female threaded insert; Fig. 2, heater terminal reinforced with aluminum shell; Fig. 5, automobile terminal board with standard screws as inserts; Fig. 6, aluminum rivet in utensil knob; Fig. 7, an example of the use of eyelets; Fig. 9, use of punched strips in automobile switch part.

Strength and Simplification

Then, the molding process may be simplified by the use of inserts. Molding a thread on a part is generally expensive on account of the complicated die structures necessary. A machine-cut thread on a metal insert will frequently be found a better alternative. In some cases improvement in strength is the object. The heater terminal end shown in figure (2) is quite small and provides insulation and support for terminals. The aluminum shell supplies the required strength.

Inserts may be used in hot- or cold-molded parts. It is only necessary to keep in mind the limitation of the particular process when the part is designed. For instance, the molding material becomes partially fluid in the hot molding process and therefore the sizes of the inserts must be held accurately so as closely to fit mating parts in the mold to prevent the formation of objectionable fins. Again, the molding pressures necessary in cold molding may be three to five times those in hot molding and therefore the inserts must be designed to withstand these pressures.

Single female threaded inserts are perhaps in most frequent use and consideration of their design will bring up points common to other forms. Figure (3) shows a typical design of open end insert suitable particularly for cold molding. For hot molding the design is very similar except that the end at E is generally left closed to prevent the entrance of the compound into the annular space formed by the thread grooves along the usual cylindrical locating pin in the mold. Open end inserts may be used in hot molding with threaded locating pins but the complications necessary for removal of the part generally make this procedure undesirable.

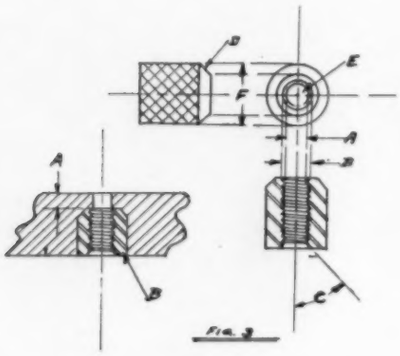
For retaining the insert rigidly in the molding the cylindrical surface is heavily diamond-knurled. The same object is sometimes attained by the use of hexagonal stock with a shallow turned groove. The former design is cheaper and in most cases as satisfactory.

Relative Size Important

The most important dimension and the one most frequently overlooked is the tap drill size shown in figure (3) at A. This size must be large enough to allow the insert always to go over the locating pin in the die —otherwise delays in the pressing operation must ensue. At the same time the hole must generally be a close fit to the locating pin. In the open end insert this close fit prevents the compound from entering the thread to any extent. In the closed or open end insert a close fit is necessary where accurate center location is desired. A tolerance on this size of plus .004 and minus .000 relative to

the locating pin diameter is satisfactory.

Commercially, the tap drill size is selected in relation to the dimension B to leave from 50% to 70% of a full thread. A full thread is expensive to make as it slows up machining time and results in a great increase of tap breakage.



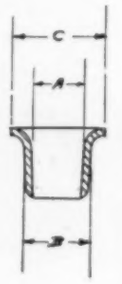


Fig. 3, a typical open-end insert adapted for cold molding; Fig. 4, indicates the correct ratio of length to thickness; Fig. 5, the correct section for an eyelet.

The outside diameter F is selected in relation to the dimension B to leave a wall sufficiently heavy to withstand the molding pressure. This is about 2000 lbs. per square inch for hot molding and from 5000 to 10,000 lbs. per square inch for cold molding. When the insert is to project from the face of the molding it is desirable to leave this projection smooth and not knurled so as to get a closer fit to the mating cavity in the mold, preventing fin formation. A close size tolerance on the outside diameter is not necessary for obvious reasons, except where the insert projects from the face of the molding.

Length of Insert

Usually the length of the insert is determined by mechanical considerations, except that with holes which do not go through the molding, a maximum length of twice the tap drill diameter is desirable to prevent breakage of locating pins from the flow of the compound during molding. Also, where the hole goes through the molding it is usual to leave a thin section of compound at one end as shown at A in figure (4). The thickness of this section is so selected that variation in the charge of compound in the mold cavity which causes variation in overall thickness of the molding will never cause the mating parts of the mold to close down on the insert and crush it. With the positive type of mold used in cold molding and some types of hot molding such variations in thickness of the part may generally be held below plus or minus .010. The allowable tolerance in length of such inserts may be deduced from these figures.

To assist the flow of the compound a chamfer is provided at D figure (3). To facilitate the ready insertion of the screw in assembly a countersink is provided at C.

Threaded Inserts

Wherever the insert fits the mold, as on the locating pin and on the exposed face of the molding (B figure 4), it is necessary to leave the surface smooth and free from burrs. Otherwise irregularities hinder rapid pressing and allow the entrance of compound into the threads. Where very close fits to the locating pin are used it is necessary to ream the tap drill hole after tapping.

Under some conditions, even with great care with fits and smooth surfaces, compound will enter the threads of female inserts. This may necessitate retapping to clear the threads after molding. In most cases attention to these details will, however, obviate the necessity for this additional operation.

A cheap form of female threaded insert is afforded by the use of standard punched nuts. As such nuts are commercially not held to a close tap drill size, it is usually necessary to ream to obtain a close fit to the locating pin.

The main considerations outlined above apply also the plain tubular inserts. These are used to supply bushings for holes often for metallic bearing surfaces.

Use of Standard Screws

Male threaded inserts are often in the form of standard round or flat head screws. Round head screws are preferred as they assist the flow of the compound in molding. From a molding standpoint the important dimension is the outside diameter of the thread to obtain a close fit with the mating mold cavity. Figure (5) shows an automobile terminal board using standard screws for inserts.

In a similar manner to that explained in connection with female threaded inserts, if care with fits is exercised the fin formed at the base of male threaded inserts will not be objectionable. In some cases this fin must be removed by re-chasing the thread. In figure (5) the fin is plainly visible but on account of the detail of assembly parts is unobjectionable.

A flattened end obtained by swaging or a heavy knurl is frequently the means for holding male inserts into the compound. Solid rivets are in considerable use. An example is shown in figure (6). This knob is used on aluminum hollow ware and is provided with an aluminum rivet for an insert.

Eyelets

On account of their cheapness and because assembly may be accomplished with little riveting pressure, hollow rivets or eyelets, as they are known in the trade, are widely used. Figure (7) shows an attachment plug cap employing this form of male insert. Figure (8) shows a section of an eyelet suitable for molding. There are several

(*Continued on page 106*)

The Age of Molding

IV. So versatile are modern phenol resinoids, that the number of unusual examples of molded articles is rapidly growing.

By A. Moses

Writing under the caption "Beauty in America", Harvey M. Watts says in January "Forum":

"A thing is not less beautiful because there are millions of other things like it in the world".

"It is likewise far from the truth when one says that machine-made things are ugly and have invariably been so, or that it is impossible to have mass productions of machine-made articles without violating the canons of beauty."

* * * *

IN thinking of the applications of phenol resinoid molding compounds, the more industrially utilitarian come uppermost. This is not surprising seeing that the outstanding characteristics of these materials are their electrical, thermal, mechanical and chemical properties. In addition there are such valuable attributes as low density, enduring beauty and faithful reproduction of the minute details of the mold. It is these latter values that have taken the molded phenol resinoids into some rather unusual fields.

A wine set molded in Bakelite, distinctive and non-chipping.

Consider commercial souvenirs. In their very nature they must be cheaply produced in large quantities, yet, in general,

Bakelite decorative medallions molded complete to the last detail. They are light, colorful and durable.

of artistic value withal—natural applications for the plastic materials. So it happens that we find pyroxylin plastic and shellac materials early utilized for this purpose.

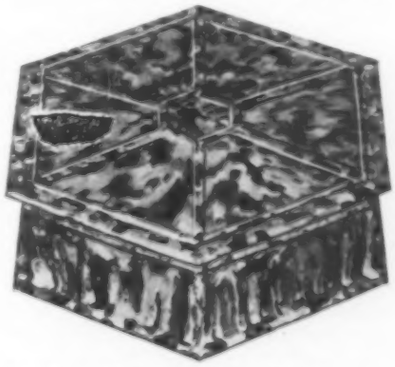
At the World's Fair held at Chicago in 1893, the Heinz Company distributed a miniature pickle molded of shellac to simulate its staple product. For decorating its boxes and callendars, the J. E. Newman Company is utilizing medallions of Bakelite. Molded in relief, they are accurate, colorful reproductions, lighter than similar metal mementos. The latter is of some importance when figuring mailing costs.

This property of precise reproduction is two-edged. Seeing that even the polish on the mold is reflected in the product, the greatest possible accuracy in mold construction is entailed.

Non-chipping Tableware

Tableware that will survive rough masculine handling has always been much sought after by the housewife. Such articles, of British manufacture, molded of a thiourea resinoid have already been described. In this category, come wine sets and so long as the deprivations due to Prohibition do not become world-wide, there will still be some demand for them. It was with the idea of introducing something unusual that a molded wine set was introduced. For this purpose, the molded phenol resinoid Bakelite combined the bizarre with the non-fragile to produce a product unaffected by alcoholic liquids.

Marketing his product in a container of permanent value is a well-tried merchandising device. For such purposes, rather ephemeral materials as cardboard, paper, tinned iron and glass are at a disadvantage. Plastic materials combine the properties of permanence, beauty and colorfulness and are being used to an increasing extent for containers. One such sales aid was very recently discussed MOLDED PRODUCTS, January, 1928, page 46). We refer to the Bakelite powder jar introduced by Terri, Inc., to promote the sale of its face powder.



A sales aid for candy. Candy consumers may use this Bakelite bon bon box as a permanent receptacle.

A somewhat similar application is now found in the candy field, where the changes have been rung on the scale of containers, winding up with the musical candy box. There still

(*Continued on page 110*)

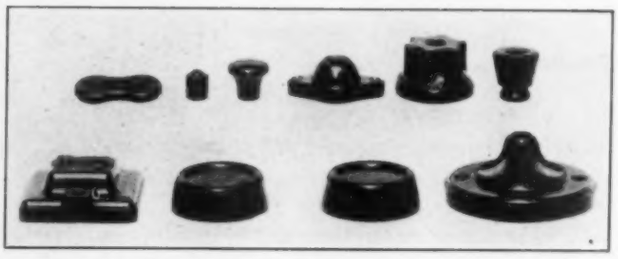
A New Departure in Color Effects

Recent developments in the art of cold molding have overcome difficulties formerly experienced in achieving permanent color effects with this type of material.

"Never before has such a note of color prevailed in the furnishings of the American home as there is today. They (the supercritics) seem to have disregarded the necessity for the large production of objects of the lesser arts and the necessary duplication of an article so charming that it must accomodate a populace of some hundred and twenty millions".

Harvey M. Watts, in "Beauty in America" an article in January "Forum".

* * * *



A selection of cold molded parts in black, green, red, brown and various mottles. (Courtesy Connecticut Molded Products Corp.)

WITH the spread of the vogue of color into every phase of daily life, the need arises for introducing color even where comparatively inexpensive parts are used. Until recently, cold molded products have been unable to play a great part in these developments, and for this reason—color effects are difficult to obtain with cold molded materials available.

Avoiding technicalities, cold molding compositions as ordinarily compounded consist in essence of an asphaltic base binder reinforced with an asbestos filler. Briefly, the process consists in compressing the molding composition into a single cavity mold, followed by curing in ovens under heat control.

Difficulties Overcome

Being dark colored, the binder naturally inhibits the production of bright colors. Again, the proper dispersion of color to obtain a product devoid of spotty appearance has also been a difficulty. By avoiding the use of a dark colored binder and by careful air separation of the asbestos, the Connecticut Molded Products Corp. has solved the difficult problem of imparting color to cold molded products.

While wood flour has been described as the "backbone" of molded products, asbestos may rightly be called the "heat safeguard". Thus it happens that cold molded parts find their natural outlet where heat resistance is a necessity. Among such applications come handles for kitchen utensils, stoves, and radiator valves and foot rests for stoves. Such colored components can take part in the metamorphoses imposed upon the kitchen by the magic wand of color.

Electrical Fittings in Color

What is known as the correct "ensemble" is now an important consideration in schemes of interior decoration. In its attainment, electrical fittings colored in harmony are needed. To be up-to-date, molded fittings are the thing and now colored cold molded parts are available. Among such fitments are bell ringers, connectors, sockets, and covers for switches and coils.

Pastel Shades

For certain applications, notably bathroom fixtures and certain electric toilet articles, wooden parts lacquered in light colors are being used. Wood for such fittings has its disadvantages—it may absorb moisture, shrink or warp. These shortcomings are particularly pronounced where the part is likely to become hot.

Effectively to replace such wooden components without unduly increasing the cost has in the past been a problem. Cold molded parts were out of court as stoving them tends to darken any delicate color.

Lacquering

Lacquering after curing presented itself as a possible solution, but was beset with these difficulties—the dark color works through the lacquer with time.

Now, using a light colored base and a suitable primary coat, this difficulty has been overcome by the same company.

"How the Molder May Safeguard the User"

In the March Issue

NEMA To Promote Molded Products

Sixteen molders organize to further the interests of the industry, which is one with potentialities so widespread as to make successful promotion difficult

REPRESENTATIVES of sixteen companies engaged in manufacturing molded products met at the offices of the National Electrical Manufacturers' Association January 26 to reorganize as the Molded Products Section of NEMA.

These manufacturers have organized for cooperative effort at various times in the past, only to dissolve for one reason or another. Members of this Section, however, have now pledged mutual support on a basis promising definite accomplishment in the interests of the industry.

Employing the acid test on those present, C. A. Kurz, Jr., submitted two questions:

"Will every member give the Chairman and the Executive Committee his whole-hearted support?" he queried.

"Yes," said every representative.

"Will each member support recommendations of the Executive Committee, even if they are hurt?" All answered in the affirmative.

Benefits of Cooperation

Mr. Kurz, who was subsequently elected to the Chairmanship of both the Molded Products Section and the Executive Committee of that group said in effect that there were no limitations to the benefits of cooperative effort, but that if anyone present was not ready to meet the above requirements, he would save both time and money by abandoning all thought of joint action immediately.

The Section is immediately interested in problems of cost accounting, trade practices, development of new markets, and establishment of standard contract warranties.

C. A. Kurz, Jr., elected president of the Molded Products Section of NEMA, Jan. 26.

In the last connection, the Executive Committee suggested four recommendations for submission to the Molded Products Section at its next meeting to be held within the next sixty days:

(1) That the full cost of dies should be charged to the customer and so quoted.

(2) That tools should be paid for in full by the customer upon submission of samples.

(3) That dies represent the result of years of experience not included in the charge made for the dies, and that an additional charge should therefore be made if any customer requests the delivery of a die.

(4) That dies may be destroyed if no parts are ordered from the manufacturer for a period of two years.

The Section Committee on Cost Accounting plans a study of the NEMA Manual of Uniform Cost Accounting in conjunction with an analysis of the system followed by each company.

Two suggestions regarding practices were proposed by the Executive Committee for presentation at the next meeting of the Section:

(1) It is unethical for any manufacturer to use the dies or tools of another manufacturer without his consent.

(2) Whenever dies or tools exist in the industry, they should be utilized so that the duplication of dies may be eliminated.

The question of a generic name for molded products is being taken in hand by a committee which includes W. H. Kempton of Westinghouse Electric & Mfg. Co., who will later make a complete report with definite recommendations.

Companies Involved

The companies pledging mutual support in the activities of the Molded Products Section of NEMA at the re-organization meeting January 26 are:

Alden Mfg. Co.,
American Insulator Corp.,
Belden Mfg. Co.,
Colt's Patent Fire Arms Mfg. Co.,
Connecticut Molded Prod. Corp.,
Cutler Hammer Mfg. Co.,
Garfield Mfg. Co.,
General Electric Co.,
Hemco Electric Co.,
Johns-Manville Corp.,
Kurz-Kasch Co.,
Northern Industrial Chemical Co.,
Norton Laboratories,
Reynolds Spring Co.,
Shaw Insulator Co.,
Westinghouse Electric & Mfg. Co.

Market Research

Association research in determining markets offers the most feasible plan for development of new uses of molded products, according to a report submitted by H. D. Randall, General Electric Company, to the re-organization meeting of the Molded Products Section, National Electrical Manufacturers Association, January 26.

Mr. Randall asserted:

"Efficient marketing is the basis of profits, and profits are the basis of all business. Marketing research can be started with a moderate expenditure, and it is quite possible that within NEMA's own facilities we can secure sufficient assistance to establish a proper ground work."

Value of Associations

Linking this subject with the new fight between industries for markets, Mr. Randall commented:

"Nowadays, we have come to realize that no concern can be prosperous if it is a part of a generally unprosperous industry, and that the really dangerous competition is between industry and industry. If an outside industry is taking away your business, it is only by presenting the united front of your whole industry that you can hope to offset it. Individual efforts are powerless. It is for this reason that the growth of trade and business associations has been so rapid in the past decade. With the keen competition which we are experiencing now, and with the much more intense competition that we may expect in the future, only those industries may prosper whose marketing policies and plans are highly efficient."

Difficulties

Because molded products are not a primary supply to any single industry, Mr. Randall deems market determination in this field peculiarly difficult.

"Where in most other industries it is relatively easy to select and rate worthwhile markets according to their practical yield, the universality of potential uses of our products almost compels us to shot-gun methods of scattered selling".

"A vast amount of research is possible of this one factor of market determination to guide us in concentrating manufacturing and sales effort in the field for which the product is best suited and where profitable results are possible. This involves a study to determine the services which our product can perform in the different industries and how important these services are to specific industries".

"With the period of patent limitation for resinoid manufacture at an end, the manufacturer of molded products must now take over in earnest the major problems involved in the advertising and selling of his products, with special emphasis upon market research".

"We are fortunate I feel, that one good trade paper has arisen in this field. I refer to PLASTICS and MOLDED PRODUCTS."

The Up-to-date Safety Razor

(*Continued from page 96*)

itive prices, the safety razor must be essentially a mass production proposition. It could not be long therefore, before the possibilities of the molded part began to receive attention as an improvement over metal.

One result is the appearance of the safety razor with the molded phenol resinoid handle —the "Shav-Rite" made by Hiscox Products Co. Such a handle is non-absorbent and pleasant to handle. Neither damp nor rough usage will mar its surface. Its design is susceptible to greater refinement. Nineteen handles are molded together and are shrunk on to the metal shanks.

Feminine Interest Enters

There is another factor to be considered—the growing feminine interest in this instrument once so wholly a masculine accessory. There could be but one outcome—the incursion of color. The Hiscox razor handle comes in black, red, olive, bright green, walnut, mahogany and onyx. Plastic materials with all their potentialities for beauty and bright color stand ready to meet any demand created by mankind's innate craving for colorfulness.

Designing Inserts for Molded Parts

(*Continued from page 98*)

points which must be observed in the design of eyelets.

1. The metal must be of sufficient thickness and temper to prevent crushing in molding.
2. The diameter of the head of the eyelet C must be small enough to prevent crushing in molding.

3. The inside diameter A and outside diameter B must be held to close tolerances to fit properly on the locating pin and in the mating cavity.

A wide variety of shapes is available for the ingenious designer. The design in figure (2) was chosen to give strength and provide for side and axially tapped assembly holes. In such designs extreme accuracy in the insert is necessary or excessive trouble in locating on pins and cavities will ensue.

Punched Strips

Punched strips are frequently used to provide contact surfaces and electrically-connected binding screw holes. Figure (9) shows such a part used on an automobile switch. The accurate spacing of holes to fit locating pins is necessary.

The usual material is of course metal—brass, copper, aluminum, steel, etc. The metal selected depends chiefly on the application. Molding conditions must not however be overlooked—for instance some types of cold molding compounds and hard rubber contain sulphur which corrodes copper very rapidly. The remedy is the use of brass or nickel-plated metal.

Non-metallic Inserts

The use of non-metallic inserts offers opportunities in design which have been little developed. For instance, separately molded colored sections may well be molded into position. Again, punched or machined laminated phenolic sheet, rod, or tube may be molded in place very readily and quite serviceably, provided that the safe temperature for such material is not exceeded in curing.

Ideal Placement

A comprehensive discussion of the location of inserts involves a more detailed consideration of mold and molded part design than is possible here. It will suffice to say that the most ideal location is such as to place the locating pins or depressions coaxially, with the direction of molding. This obviously causes

the least complication on removing the part from the mold. In some designs this is impossible. With certain arc shields the inserts are at right angles to the direction of molding. The locating pins are withdrawn with a separate motion before removing the part from the mold.

Age of Molding

(*Continued from page 99*)

remained possibilities for phenol resinoid and these have been realized in the molded candy box. Colorful and novel, its durability ensures a useful life long after its original contents have been disgorged.

While in the present article the writer has confined himself to products of unusual application but not out of the usual size, the near future of this Age of Molding will see the entry of much more ambitious applications. Although the molded submarine has already been the subject of the inventor's zeal, the molded seaplane float has already been tried. The needs of the industry impose a temporary silence, however.

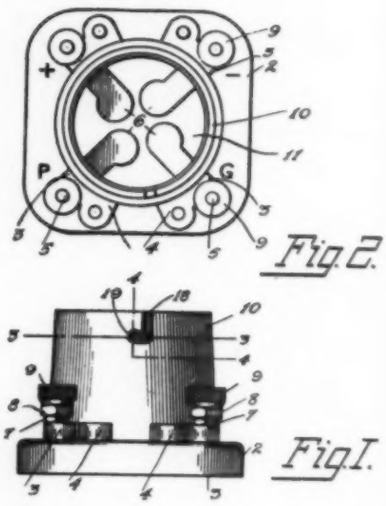
Putting Eyes in Umbrellas

DID you ever bump into a fellow pedestrian while carrying an umbrella on the sidewalk? Of course you have. Everybody has. The conflict of umbrellas on a rainy day sometimes becomes a serious problem in congested districts. Persons blinded by their own umbrellas step blindly in front of moving automobiles and thus endanger their lives.

An inventor thinks he has solved this problem by devising an umbrella with a pyroxylin plastic window in the roof. Such an umbrella, he says, would give the carrier a better view of traffic and would eliminate many accidents. It seems to us, however, that the novel umbrella would be practically useless for the purpose it is intended to serve unless it were equipped with a "windshield wiper". Otherwise it would constantly be clouded by the rain.

Molded Products

Reinforcing the Molded Radio Socket.



Figs. 1 and 2 represent the socket in plan and elevation respectively

RADIO sockets for holding any standard four-prong base vacuum tubes are the concern of this patent. The latter in addition to four prongs are provided with pins secured to the side of the tube bases and are adapted to be inserted into bayonet slots for holding the tubes against displacement and at the same time hold the prongs of the tube in contact with the terminal springs.

The majority of sockets now in use are molded, and it has been found that care must be exercised when inserting or removing the tube that no undue pressure or pull is applied. This is necessary as there is a liability that the wall of the socket around the bayonet slot will be cracked or broken, and thus render the socket useless.

Therefore, the new sockee aims to overcome this objectionable feature and provide an improved tube socket structure. Another feature is the provision of a suitable metal insert molded in the wall of the socket to reinforce the portion of the wall containing the bayonet slot.

This insert is provided with novel anchoring means.

In the drawing.

Fig. 1 is an elevation of the tube socket.

Fig. 2 is a plan view of fig. 1.

Fig. 5 is a perspective view of the metal reinforcing insert.

The socket comprises a suitable base 2 molded of a suitable insulating compound.

This has a cylindrical socket wall 10 with opening 11 of a size to fit any standard vacuum tube. The metal reinforcing insert or plate 12 is rectangular in shape and is made of thin metal such as brass, about one-half the thickness of the socket wall 10, and bent so as to conform with the inner surface of the socket wall. The metal plate 12 is provided with a bayonet slot 14, a number of holes 15 and a pair of tongues 16 shaped by shearing as shown.

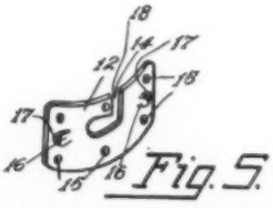


Fig. 5.

The reinforcing insert

The latter extend into the molded compound, and the opening 17 permits the compound to flow into them during the molding process. The compound also enters the orifices 15 in the insert 12, and the tongues 16 embed themselves in the molded compound, anchoring the insert or plate 12 in position.

The openings 15, which are also filled with the compound, form an additional anchorage to prevent any sidewise movement of the insert 12. The vertical portion 18 of the slot in the wall 10 of the socket is formed during the molding operation. The horizontal portion 19 is drilled through the wall 10 of the socket to conform with the horizontal portion of the bayonet slot 14 in the metal insert 12.

The socket is covered by U. S. Patent 1,653,869 issued Dec. 27, 1927 to E. J. Nielsen and assigned to Kellogg Switchboard & Supply Co.

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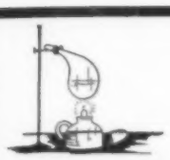

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for the Plastics Industries

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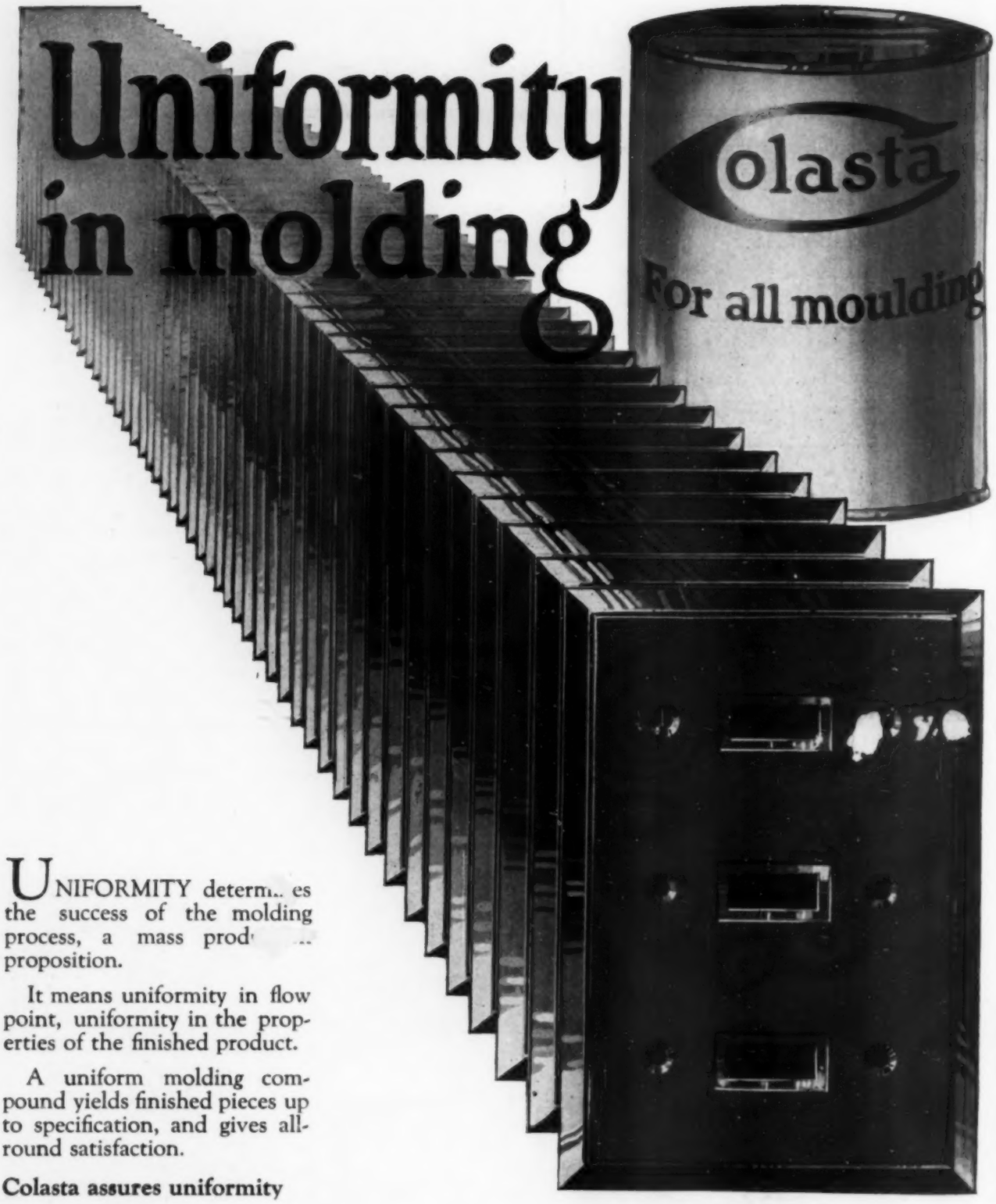

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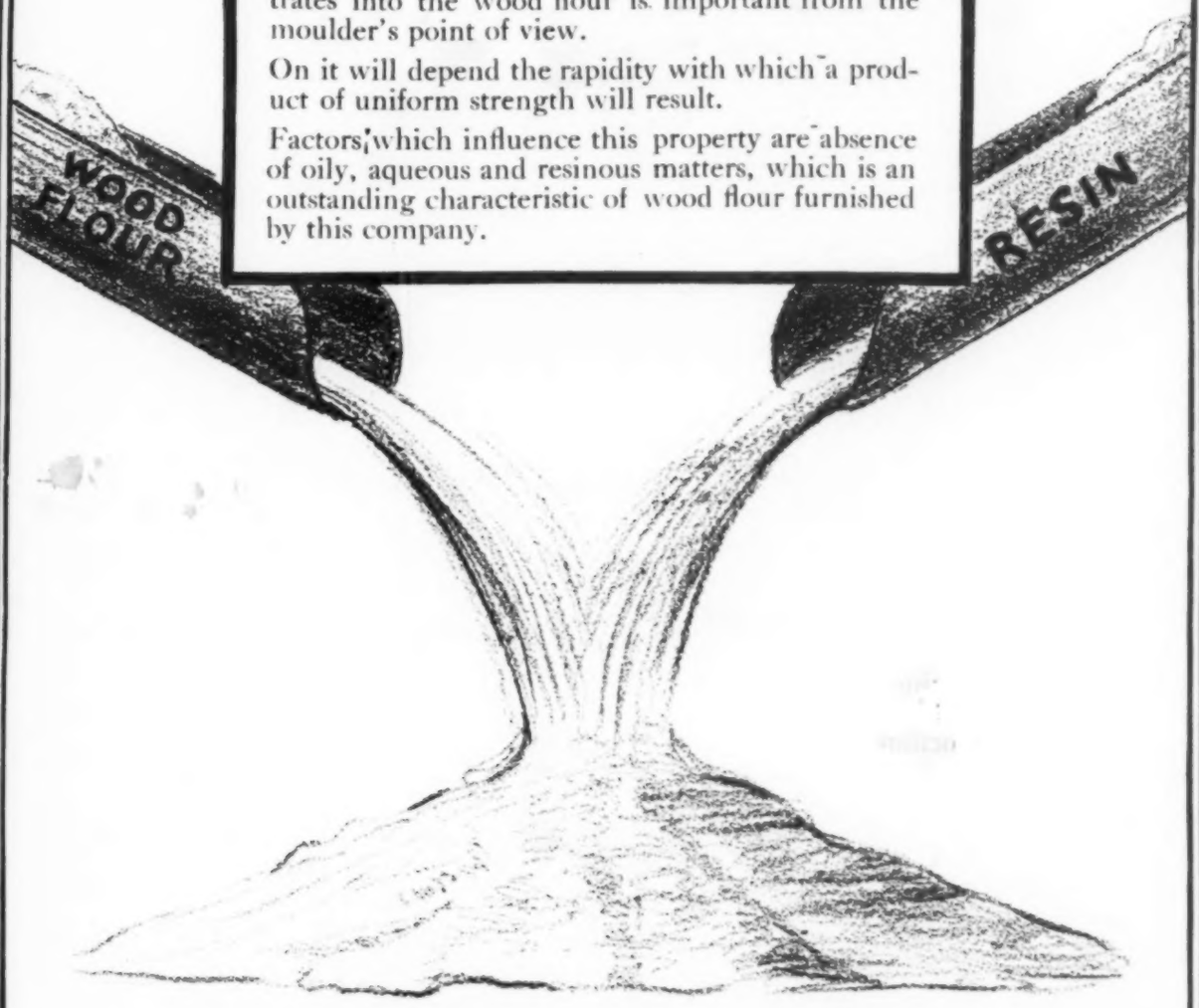

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